

REMARKS

Claims 3-19 are pending in the present application. Claims 9-12 are objected to for informalities. Claims 5-8 are rejected under 35 U.S.C. §112, first paragraph. Claims 4 and 15 are rejected under 35 U.S.C. §102(b) as anticipated by Chase et al., U.S. Patent No. 3,431,061. Claim 3 is rejected under 35 U.S.C. §103(a) as obvious over Chase et al. Claims 5, 7, and 8 are rejected under 35 U.S.C. §103(a) as obvious over Chase et al. in view of Wadas, Jr., U.S. Patent No. 5,718,851. Claim 13 is rejected under 35 U.S.C. §103(a) as obvious over Chase et al. in view of Seidner, U.S. Patent No. 5,447,686. Claim 14 is rejected under 35 U.S.C. §103(a) as obvious over Chase et al. in view of Seidner and further in view of Reeves et al., U.S. Patent No. 5,725,613. Claim 6 is objected to for being dependent on a rejected base claim but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. Claim 6 is rewritten in independent form. Accordingly, it is respectfully requested that claim 6 is indicated as allowed in the next Office Action.

Objections to the Claims

The Examiner objects to claims 9-12 for being in improper multiple dependent form. Claim 9 is amended to proper form. It is respectfully submitted that

claims 10-12, either directly or indirectly, are in proper form as they depend in the alternative. Accordingly, it is respectfully requested that all objections to the claims be withdrawn.

Rejections Under 35 U.S.C. §112, First Paragraph

The Examiner rejects claims 5-8 for not being supported by the specification. The specification is amended to recite the features of claims 5-8. No new matter is added. Accordingly, it is respectfully requested that all rejections under 35 U.S.C. §112, first paragraph be withdrawn.

Rejections Under 35 U.S.C. §102(b) and §103(a)

The Examiner rejects claims 4 and 15 as anticipated by Chase et al. and claims 3, 5, 7, 8, 13 and 14 as obvious over Chase et al. or Chase et al. in view of other references. Applicants respectfully traverse these rejections. Independent claim 15 recites, in part,

the oxygen content inside the cover is less than 0.1 vol. % after an adjustment period of 3-10 days during the entire storage time.

This limitation is not taught by the cited art. Specifically, the Chase et al. reference does not teach the present claimed oxygen content.

The Examiner has taken the position that the presently claimed invention is identical to that of the Chase et al. reference. This is not so. The disclosure of Chase

et al. does not provide a closure with the claimed limitations of the present invention.

For instance, as a bottom cover, Chase et al. use a thermoplastic sheet of PE, PVC or similar materials (column 2, line 16). A single or multilayer covering of polyurethane foam is proposed to cover the wood (column 2, line 31).

*the same material may be used
speculation*

Because of the different materials for the bottom sheet and the covering sheet, effective welding of the different materials with heat-welding equipment is precluded. The use of adhesives is also a problem under practical conditions of the site in Chase et al. Thus, the disclosure of Chase et al. does not provide an oxygen content as presently claimed.

Accordingly, as the cited art fails to teach or suggest the presently claimed invention, it is respectfully requested that all rejections under 35 U.S.C. §102(b) and §103(a) be withdrawn.

Newly Added Claims

It is respectfully submitted that claims 16-19 are allowable over the cited art as they depend from claim 15, discussed above.

In the Abstract

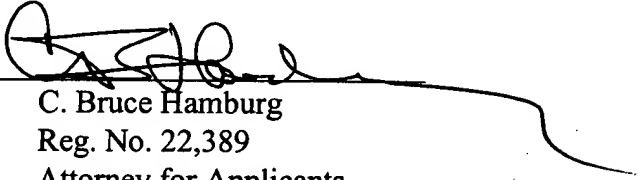
An obvious error in the Abstract has been corrected to conform the Abstract to the claims and specification.

Applicant respectfully requests a three month extension of time for responding to the Office Action. Please charge the fee of \$920.00 for the extension of time to Deposit Account No. 10-1250.

In light of the foregoing, the application is now believed to be in proper form for allowance of all claims and notice to that effect is earnestly solicited. Please charge any deficiency or credit any overpayment to Deposit Account No. 10-1250.

Respectfully submitted,
Jordan and Hamburg LLP

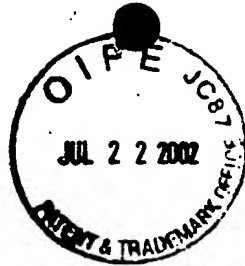
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APPENDIX I

AMENDED CLAIMS WITH AMENDMENTS INDICATED THEREIN
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3. (Amended) Method according to Claim 15 in which before the beginning of the respiratory and fermentation processes, the volume of air inside the cover is minimized.

4. (Amended) Method according to Claim 15 in which a rigid or flexible envelope is used as cover, whereby the space inside the cover is sealed air-tightly and light-tightly, from the environment.

5. (Amended) Method according to Claim 15 in which a single or double, UV-resistant plastic film with a high diffusion resistance is used as the cover.

6. (Amended) Method [to Claim 15 in which] for preservation storage of green round wood and sawn timber comprising stocking green round wood or sawn timber under a cover, whereby respiratory and fermentation processes by fungi, bacteria, and respiratory processes of wood cells that are still alive are promoted, wherein the cover is absolutely air-tight and light tight and thereby the oxygen content inside the cover is less than 0.1 vol. % after an adjustment period of 3-10

days during the entire storage time, and the CO₂ content is higher than 21 and up to 40 vol.% which to a great extent prevents the growth of wood-destroying fungi, and the cover is a double, two-layered film [is used] whose black internal surface prevents the light from entering and thereby growth of algae, and whose white external surface reflects the sunlight.

7. (Amended) Method according to Claim 5 or 6 in which the films are welded either separately or simultaneously with double welds.

8. (Amended) Method according to Claim 5 or 6 in which the films are bonded with each other.

9. (Amended) Method according to Claim 5 [and] or 6 in which the films are arranged plane on top of each other, clamped between two strips, tightly, wrapped around said strips, and secured using a damping device.

10.(Amended) Method according to Claim 15, 3, 4, 5, or 6 in which gas measuring flexible tubes that penetrate the films are attached to the films using bulkhead fittings.

11. (Amended) Method according to Claim 15, 3, 4, 5 or 6 in which the bulkhead fittings are provided with extension hoses inside the cover, and the hose ends are laid showing to opposing sides of the space inside the cover.

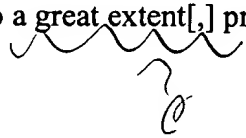
12. (Amended) Method according to Claim 11 in which measuring instruments are connected to the gas measuring flexible tubes through quick-connect couplings, with which measuring instruments the storage process can be checked via the gas composition.

13. (Amended) Method according to Claim 4 in which containers or holds are used as rigid encapsulations.

14. (Amended) Method according to Claim 13 in which the containers or holds are supplied with exhaust gases from combustion processes of the transportation means, or stationary plans, respectively.

15. (Amended) Method for preservation storage of green round wood and sawn timber [in which] comprising stocking green round wood or sawn timber [is stocked] under a cover, whereby respiratory and fermentation processes by fungi, bacteria, and respiratory processes of wood cells that are still alive are promoted,

[characterized in that] wherein [green round wood or sawn timber is stocked under an] the cover is absolutely air-tight and light tight [cover] and thereby the oxygen content inside the cover is less than 0.1 vol. % after an adjustment period of 3-10 days during the entire storage time, and the CO₂ content is higher than 21 and up to 40 vol.% which to a great extent[,] prevents the growth of wood-destroying fungi.





APPENDIX II

AMENDED ABSTRACT WITH AMENDMENTS INDICATED THEREIN
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The invention relates to a method for stocking and preserving green round wood and sawn timber, which is stored in an airtight and lighttight sealing cover. The oxygen inside the cover is decomposed by the respiratory process of [mushrooms] fungi, bacteria and wood cells that are still alive, thereby forming CO₂ and H₂O. Fermentation processes also lead to the decomposition of hemicelluloses and saccharides which are converted to organic acids and CO₂. The oxygen content in the cover is less than 0.1 vol. % after an adjustment time of 3 to 10 days of total stocking, while said CO₂ content rises to more than 21 and up to 40 vol. %. This method enables green round wood and sawn timber to be stocked over long periods without wastage or environmental damage.



MARKED SPECIFICATION

F-6224

Ser. No. 09/319,126

Method for stocking and preserving green round wood and sawn timber

BACKGROUND OF THE INVENTION

5 The invention relates to a method for stocking and preserving green round wood and sawn timber, of both softwood and hardwood, over long periods without loss of quality.

Conventional general preserving methods concern mainly food which is sterilized by heating in the absence of air (bottling, canning), or fumigated in dry condition with carbon dioxide (protection of grain from pests), or gassed with protective gases having special compositions (storing and ripening of fruit
10 in a nitrogen/carbon dioxide atmosphere), or cleared from insects under pure nitrogen (restoration of wood articles whose pigments would be attacked by carbon dioxide).

Methods used so far for preserving green round wood are based on storage in water or sprinkling with water. A wood moisture content of over
15 100% is aimed at in order to prevent fungal growth. Drawbacks are the high water consumption and the ground-water pollution due to wood substances, in

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connection with different moisture content in the interior of the wood stack,
which results in fungal attack (*Armillariella* species).

Further, round wood and sawn timber can be preserved for a time using
insecticides and fungicides. The application of pesticides involves endangering
5 nature and mankind.

A safe method of preservation is to convert and season the wood as
soon as possible. This, however, demands extensive conversion and seasoning
capacities to be kept in reserve, in order to be capable of quickly processing
large quantities of round wood (wind-fallen wood and other problems).

10 Also known are attempts to preserve green round wood in dry stacks.
This method, however, involves high risks of fungal and insect attacks.

From DE-OS 28 57 355 and DE-OS 34 34 551, methods are known of
influencing the wood properties by means of fungal cultures.

According to DE-OS 28 57 355, a method is known of microbiologically
15 modifying softwood using micro-organisms. These micro-organisms selectively

modify the softwood whereby the temperature, the moisture content of the wood, the O₂ content and the CO₂ content are controlled in due consideration of the micro-organisms.

5 In DE-OS 34 34 551, the round wood is deliberately discoloured by treatment with wood-destroying fungi. Discoloration occurs at those places where the fungus culture has been applied. Also the application of several fungus cultures is described which is associated with a beneficial boundary layer formation.

10 In the paper Mahler G.: Konservierung von Holz mit Schutzgas (Preservation of Wood Using Protective Gas), AFZ 47 (1992) 19, pp. 104-1025, experiments are reported to preserve wood using a protective gas. In these experiments wood with standardized dimensions was wrapped in silo films. The stacks were fumigated with both nitrogen and carbon dioxide; in each case, the threefold gas volume compared to the wood volume was
15 required. Thereby the oxygen content was reduced to 4-5 % and this content maintained over a longer-period of time (more than 6 months). After opening of the stack a fungal coating was found on the wood that is assumed to be an

antagonist, which indicates that an attack from wood-destroying fungi can be prevented by the promotion of antagonistic fungi.

Disadvantages are the fumigating demand described and the relatively high residual oxygen content.

5 SUMMARY OF THE INVENTION

It is the objective of this invention to develop a method that enables to stock green round wood or sawn timber of all wood species over a longer period of time without deterioration of quality and strength properties without previously having the wood sterilized, moistened, dried or treated with special protective gases.

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[The problem is solved using features given by Claim 1. The subclaims present advantageous developments of the invention.]

Initially, it is certainly surprising that humid, non-debarked wood is not going mouldy and not rotting under a low-exchange atmosphere. Essential to the invention, however, is that resulting from respiratory processes of wood cells that are still alive, and metabolic processes of fungi, bacteria which have been

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fed into the covering through the green round wood, or sawn timber,
respectively, a virtually oxygen-free atmosphere, enriched with carbon dioxide,
is produced.

5 The airtight cover ensures that, on the one hand, no oxygen can enter
from the exterior and, on the other hand, no carbon dioxide can exit from the
cover.

Contrary to the interpretation in Mahler, G.: Konservierung von Holz
mit Schutzgas (Preservation of Wood Using Protective Gas), AFZ 47 (1992) 19,
10 pp. 1024-1025, it is not the action of the fungal antagonists which is decisive to
prevent wood-destroying fungi from growth. It is rather the very low oxygen
content of less than 0.1 vol.-% that is essential for permanent storage
possibility.

This low oxygen content is achieved by the fact that after the respiratory
15 processes as in fruit storing in which CO₂ and H₂O are released and which end
with the consumption of the O₂, another cycle starts. In this cycle, fermentation
processes occur in that additional CO₂ is set free so that the CO₂ content further
rises.

The initiation of fermentation processes is another substantial advantage of the invention, compared to fruit storage. No degradation of cellulose or lignin takes place while only readily soluble sugars are degraded. Thus the strength of the round wood or timber, respectively, is remained.

5 The biotechnological process started after the sealing from air can be accelerated by minimization of the volume of the air within the cover.

In order to produce sealing from air, covering, advantageously a plastic film with a high diffusion resistance, is employed: To reduce the danger of leakage the film can be used in double layer. The benefit of a flexible covering
10 consists in that the volume of the air can be minimized (by suction until the film tightly wraps the stack of wood or timber).

Sealing from air can also be obtained in purpose-prepared storehouses, containers, cargo holds, lined pits, silos, or mining tunnels.

After any short-time opening of the air-tight covering to take out some
15 wood, or timber, respectively, the virtually oxygen-free atmosphere after re-sealing reproduces within a few days. The micro-organisms are able,

independent of the time of the year, to reproduce those conditions that are favourable for them.

Additionally, CO₂ stored in the wood as a porous body and salved in the water bonded in the wood, call again be released to produce a new gas balance.

5 In film storage, scaling from air of the wood or timber stacks, in case of valuable (veneer) wood also of individual trunks, is achieved by a double weld at the enveloping film, or by gluing, respectively, or by clamping of the films webs straight lying on top of each other by means of strips of wood around which the film is tightly wrapped and secured with clips from unwinding.

10 The essential advantage of the method according to the invention [consists in] is that in the preservation, storage needs no additional fumigation.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, further details of the invention will be disclosed by several examples of embodiments of the invention. [embodiment. By means of
15 the accompanying drawings it is shown by:]

Fig. 1 is an arrangement of several round logs with welded, or bonded, respectively, double film encapsulation;

Fig. 2 is an arrangement of one round log with welded, or bonded, respectively, double film encapsulation;

5 Fig. 3 is a clamping device at the film edges;

Fig. 4 is a diagram showing the gas development during storage under sealing from air; and

Fig. 5 is a diagram showing the bending strength during the storage process after storing under oxygen withdrawal with zero sample and DIN value.

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DETAILED DESCRIPTION OF THE INVENTION

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In the embodiments discussed below a single or double, UV resistant plastic film with high diffusion resistance may be used as the cover or a single or double, two layered film with a black internal surface which prevents light from entering and thereby growth of algae and a with a white external surface

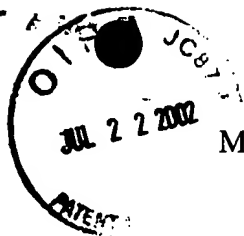
which reflects light may be used as a cover. Films may be welded separately or simultaneously with double welds or may be bonded with each other.

Example of embodiment 1

Double-layered dualene films were spread on a plane surface and 30 m³
 5 of non-debarked spruce, diameter classes 15-25 cm, were placed on them. Two
 measuring flexible tubes were laid out in the stack and attached to the film using
 bulkhead fittings. According to Fig. 1, the projecting film was then drawn over
 the stack and both films-separate from each other-welded by a double weld
 seam. After about 3 days in summer, about 10 days in winter, the oxygen
 10 content reduces to under 0.1 %. The carbon dioxide content levels off at about
 40 % (see Fig. 4). After a storage period of 24 months neither blue stain, nor
 red stripes, nor growth of Armillariella species could be detected. The bending
 strengths measured to DIN 52186 were not lower than those for green
 comparison samples (compare Fig. 5).

15 Example of embodiment 2

1 m³ of pine timber was enveloped with double dualene film, as in. Fig.
 2. Both film edges were clamped between strips and tightly wound around these
 strips. The composite thereby produced was secured from unwinding using



clips. In this way, the conditions for adjustment of the gas atmosphere can be created without any weld seam using means available on the site.

Example of embodiment 3

According to Fig. 3, a maple veneer trunk of 35 cm centre diameter, 3m
5 length, was wrapped in double-layered dualene film. Near to either butt end of the trunk, a bulkhead fitting is attached. Then the films were doubly welded. After 2 weeks an atmosphere has established that contains less than 0.1 % oxygen and whose carbon dioxide content is up to 30%.

Example of embodiment 4

10 In order to make overseas transportation possible of green round wood without damage, the wood is stacked in airtight-sealed holds, filling the hold space as completely as possible. As the holds can already be sealed water-tightly using bulkheads, sealing from air needs be produced only on the top using air-tight or sealed hatches. In order to reduce the adjustment time, exhaust gases of
15 the ship's diesel engine are piped to the hold as initial fumigation.

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